

Claims

- [c1] A disposable device for detecting the presence of a substance in a test fluid, comprising:
- a flexible and resilient first housing of generally cylindrical shape;
 - an ampoule positioned within a lumen of said first housing;
 - said ampoule adapted to sealably retain an indicator reagent;
 - said ampoule adapted to be ruptured when subjected to a manually applied, radially inwardly directed force applied to said first housing;
 - said ampoule having an outer diameter less than a diameter of said lumen;
 - a first filter positioned within a lumen of said first housing in abutting relation to a first end of said ampoule;
 - a second filter positioned within a lumen of said first housing in abutting relation to a second end of said ampoule;
 - said first and second filters being snugly received within said lumen of said first housing;
 - said ampoule having rounded opposite ends;
 - a first concavity formed in an inboard end of said first

filter;

a second concavity formed in an inboard end of said second filter;

said first concavity being complementary in size and shape to a convex first rounded end of said ampoule;

said second concavity being complementary in size and shape to a convex second rounded end of said ampoule;

whereby said indicator reagent undergoes a visually detectable change in the presence of a predetermined amount of said substance;

whereby said first and second concavities hold said ampoule in substantially coincident relation to a longitudinal axis of symmetry of said first housing.

[c2] The detector of claim 1, further comprising:
each filter of said first and second filters having an outboard end of circular configuration in transverse cross section to provide said snug fit;
each filter of said first and second filters having a downwardly tapered, diameter-reducing inboard end to facilitate sliding introduction of said first and second filters into opposite ends of said first housing.

[c3] The detector of claim 1, further comprising:
said indicator reagent occupying about one-half of said ampoule by volume.

[c4] The detector of claim 1, further comprising:
a first detent formed in said first housing in outboard relation to said first filter; and
a second detent formed in said first housing in outboard relation to said second filter;
whereby said first and second filters are constrained against longitudinal travel in an inboard direction by said ampoule and are constrained against longitudinal travel in an outboard direction by said first and second detents.

[c5] The detector of claim 1, further comprising:
a compressible washer means having a central aperture;
said compressible washer means being positioned about mid-length of said ampoule, said ampoule being received within said central aperture;
said compressible washer means having an outer periphery in substantial contact with an inner wall of said first housing;
said compressible washer having a radial extent from said central aperture to an outer periphery of said compressible washer that fully occupies a radial space between said first housing and said ampoule;
whereby said manually applied radially inwardly directed force is applied to said compressible washer and causes compression of said central aperture and hence ruptur-

ing of said ampoule; and
whereby said compressible washer provides a spacing between said first housing and said ampoule to reduce the chances that a glass shard from said ruptured ampoule will cut through said first housing and cut a finger or thumb of an individual applying said manual pressure.

[c6] The detector of claim 1, further comprising:
a flexible and resilient second housing that ensleeves said first housing;
whereby chances that glass shards, created by a ruptured ampoule in response to application of said manually applied radially-inwardly directed pressure against said first and second housings, will cut a finger or thumb of an individual applying said manual pressure is reduced by the presence of said second housing.

[c7] The detector of claim 1, further comprising:
a first hingedly mounted flap formed in an outboard end of said first filter;
said first flap adapted to admit fluid flow in one direction only;
a second hingedly mounted flap formed in an outboard end of said second filter;
said second flap adapted to admit fluid flow in one direction only;
whereby a fluid may flow through said device in only one

direction so that said indicator reagent cannot be inhaled.

- [c8] The detector of claim 1, further comprising:
 - a label having a first end that wraps completely around a first end of said housing;
 - said label having a second end that wraps completely around a second end of said housing;
 - said label having a middle section that wraps partially around said housing;
 - whereby a window is created in said middle section;
 - whereby said window enhances visual inspection of said indicator reagent.
- [c9] The detector of claim 8, further comprising:
 - said label having a front surface and a rear surface;
 - said front surface including instructional text thereon.
- [c10] The detector of claim 8, further comprising:
 - said front surface including a color code that indicates what level of a substance has been detected when said indicator reagent changes to a color associated with a color on said color code.
- [c11] The detector of claim 8, further comprising:
 - said rear surface of said label having a preselected color that contrasts with said indicator reagent when said indi-

cator reagent has changed color;
whereby said rear surface is visible through said window
when said indicator reagent is being visually inspected.

[c12] The detector of claim 1, further comprising:
said ampoule adapted to contain an indicator reagent
that changes into a plurality of differing colors depend-
ing upon a percentage of said substance detected in said
fluid;
a label secured to said housing;
a first plurality of color codes imprinted upon said label,
each color code indicating a percentage of said sub-
stance present in said fluid;
whereby if said indicator reagent changes color in re-
sponse to contact with said fluid, visual inspection of
said plurality of color codes will indicate the percentage
of said substance detected in said fluid.

[c13] The detector of claim 1, further comprising:
text imprinted directly on said first housing.

[c14] The detector of claim 1, further comprising:
graphical images imprinted directly on said first housing.

[c15] The detector of claim 1, further comprising:
at least one color code imprinted directly on said first
housing.

[c16] The detector of claim 1, further comprising:
an elongate, flexible streamer secured to a preselected end of said housing;
said preselected end being a discharge end of said housing;
said streamer being mounted so that it is in fluid communication with fluid flowing through a lumen of said housing;
whereby said streamer remains substantially in a position of repose if fluid is not flowing through said housing;
whereby said streamer is displaced from said position of repose when fluid is flowing through said lumen;
whereby an amount of time that fluid flows through said lumen may be measured by measuring the amount of time said streamer is displaced from said position of repose.

[c17] The detector of claim 1, further comprising:
an inflatable, flexible bag secured to a discharge end of said first housing;
said inflatable, flexible bag being mounted so that it is in fluid communication with fluid flowing through said lumen of said first housing;
whereby said inflatable, flexible bag remains substantially in a position of repose if fluid is not flowing

through said first housing;
whereby said inflatable, flexible bag is at least partially filled when fluid is flowing through said lumen.

[c18] The detector of claim 1, further comprising:
a container for housing said detector;
said container being formed of a material that is not easily deformed by external forces applied thereagainst;
whereby said detector may be transported when in said container and protected from breakage during said transport by said container.

[c19] The detector of claim 18, further comprising:
said container being provided in the form of a key fob so that said container and any keys used by a user of said detector will be connected to one another.

[c20] The detector of claim 18, further comprising:
said container including a main body sized to accommodate at least one detector;
said main body having a first closed end and a second open end;
a closure means for selectively closing said second open end;
whereby said at least one detector is fully enclosed within said main body when said at least one detector is positioned therewithin and said closure means is re-

leasably secured to said second open end.

[c21] A disposable device for detecting the presence of a first substance in a test fluid, comprising:

- a housing of generally cylindrical shape;
- a first porous filter positioned within a lumen of said housing;
- a second porous filter positioned within a lumen of said housing in longitudinally spaced relation to said first porous filter;
- said first and second porous filters being snugly received within said lumen of said housing;
- a first indicator reagent disposed between said first and second porous filters;
- a first hermetic seal secured to a first end of said housing;
- a second hermetic seal secured to a second end of said housing;

whereby said first and second hermetic seals are removed from said housing when said disposable device is to be used;

whereby a user blows through said lumen and said first indicator reagent undergoes a visually detectable change in the presence of a predetermined amount of said first substance in the breath of said user;

whereby said housing need not be subjected to com-

pressive forces; and
whereby no ampoule requires rupturing.

[c22] The disposable device of claim 21, further comprising:
at least one porous filter of said first and second porous
filters being treated with a second indicator reagent that
reacts to a second substance in the breath of said user;
whereby a user blows through said lumen and said sec-
ond indicator reagent undergoes a visually detectible
change in the presence of a predetermined amount of
said second substance in the breath of said user.

[c23] The disposable device of claim 21, further comprising:
said first and second porous filters being treated with a
second and third indicator reagent, respectively, that in-
dependently react to the presence of a predetermined
amount of a second and a third substance in the breath
of said user;
whereby a user blows through said lumen and said sec-
ond and third indicator reagents undergo a visually de-
tectible change in the presence of a predetermined
amount of said second and third substances in the
breath of said user.